
Separation of Short-toed *Circaetus gallicus* and Beaudouin's Snake Eagles *C. beaudouini* in western Africa

Ralph Buij^a and Dick Forsman^b

Séparer le Circaète Jean-le-Blanc *Circaetus gallicus* du Circaète de Beaudouin *C. beaudouini* en Afrique de l'Ouest. Des caractéristiques sont présentées qui facilitent la distinction entre le Circaète Jean-le-Blanc *Circaetus gallicus* et le Circaète de Beaudouin *C. beaudouini* en Afrique de l'Ouest. Les descriptions sont basées sur des observations faites pendant tous les mois de l'année sur les aires de reproduction et de post-reproduction du Circaète de Beaudouin et les aires de migration et d'hivernage du Circaète Jean-le-Blanc. Des détails de plumage d'oiseaux de tout âge sont fournis, illustrés par des photos d'individus perchés et en vol. Il s'agit notamment de plumages de transition et des jeunes de *C. beaudouini* qui n'ont pas encore été décrits de manière adéquate. Contrairement aux idées reçues, la séparation des deux espèces devrait être relativement simple.

Summary. Features facilitating the separation of Short-toed Snake Eagle *Circaetus gallicus* from Beaudouin's Snake Eagle *C. beaudouini* are presented. Descriptions are based on field observations made in all months of the year at the breeding and post-breeding sites of Beaudouin's Snake Eagle and the migration and wintering areas of Short-toed Snake Eagle. Plumage details of birds of all ages are given and illustrated by photographs, especially the transition plumages of *C. beaudouini* and those of young birds, which had not been adequately described to date. Contrary to widespread belief, separation of these species should be relatively straightforward.

Despite significant advances in the field identification of Beaudouin's Snake Eagle *Circaetus beaudouini* (Clark 1999, 2000), especially its separation from Short-toed Snake Eagle *C. gallicus*, few field guides and handbooks correctly depict juvenile and adult plumages. To further complicate matters, Beaudouin's Snake Eagle is treated as a race of Short-toed Snake Eagle in some widely used regional field guides (e.g. Zimmerman *et al.* 1996, Stevenson & Fanshawe 2002). This is hampering monitoring efforts, particularly in West Africa where Beaudouin's Snake Eagle appears to have significantly decreased since the 1970s (Thiollay 2006), as a result of which it is currently considered Vulnerable on IUCN's Red List (IUCN 2013). In Sahelian West and Central Africa, Beaudouin's and Short-toed Snake Eagle co-occur during much of the year, although the bulk of their populations are fairly well separated at different latitudes during the year (Thiollay 1978). During the dry season, or boreal winter, when most Short-toed Snake Eagles visit sub-Saharan Africa and the identification problem is most acute, the bulk of the Beaudouin's Snake Eagle population occurs in Sudano-Guinean savannas south of the largely Sahelian range of the Short-toed Snake Eagle. However, many Beaudouin's Snake Eagles can

linger in the Sahel, and Short-toed Snake Eagles migrate south into Sudano-Guinean savannas i.e. the dry-season breeding range of Beaudouin's Snake Eagle (Thiollay 1977, Buij *et al.* 2013).

Here, we present various additional field marks to those previously described in publications on the identification of these species (Clark 1999, 2000, Clark & Barlow 2004), which should further aid researchers aiming to elucidate the relative abundance, trends and distribution of both species in western Africa. We focus on plumage characters of all ages, notably juvenile and transition plumages of Beaudouin's Snake Eagle, which have not been adequately described and are inaccurately depicted in nearly every guide and handbook.

Methods

The descriptions of both species are based largely on photographs and observations of Beaudouin's Snake Eagle in Cameroon, Benin (RB), Senegal, Ghana, Uganda (DF) and The Gambia (RB & DF), and of Short-toed Snake Eagle widely in western Africa, Europe and the Middle East, mostly in Spain and Israel. Observations in Cameroon covered all months of the year, and were centred on the breeding and post-breeding dispersal ranges of Beaudouin's Snake Eagle, and



Figures 1–2. Juvenile Beaudouin's Snake Eagle *Circaetus beaudouini*, Cameroon, 20 July 2008 (Ralph Buij). Unlike any plumage of Short-toed Snake Eagle *C. gallicus*; note narrow bars on white-tipped, dusky secondaries, pale primary windows and indistinct bars on tail. The extent of rufous coloration varies between individuals (these are two different birds) and light conditions. *Circaète de Beaudouin* *Circaetus beaudouini* juvénile, Cameroun, 20 juillet 2008 (Ralph Buij). Diffère de n'importe quel plumage du *Circaète Jean-le-Blanc* *C. gallicus*; noter les fines barres horizontales sur les rémiges secondaires sombres à bout blanc, la 'fenêtre' pâle sur les primaires et les barres peu distinctes sur la queue. L'étendue de la coloration rousse varie entre les individus (les photos représentent deux oiseaux différents) et les conditions d'éclairage.

the southern part of the winter range of Short-toed Snake Eagle.

Results

Plumages are described for three age categories, which can be reliably distinguished in the field: juveniles, transition-plumage types and adults.

Juveniles

Juveniles of both species are easily separated in the field.

Underparts. Juvenile *beaudouini* have dark rufous-brown underparts, although the intensity of the rufous tone varies between individuals and with light conditions. Feathers on head and upper breast are often slightly paler (Figs. 1–2). Thighs, vent, axillaries and undertail-coverts

are broadly barred (Figs. 3–4), the throat is coarsely mottled in some juveniles, possibly as a result of moult in older individuals, and 3–4 (depending on wear) indistinct bars are visible on the tail (Figs. 1–4). Remiges have a diffuse subterminal band and 3–4 narrow bands, with the exception of pp6–10, which have dark tips. Secondaries are darker than the (whitish) primaries, especially the outer webs, with a pale window at the base of the primaries. The lesser and darker brown median coverts are variably mottled rufous-brown, while greater coverts are whitish with dark rufous-brown tips. Secondaries display a bulging trailing edge, with an indentation near the body. Fresh juveniles (July) have narrow whitish tips to the remiges, which are gradually lost with wear.



3



4

Figures 3–4. Juvenile Beadouin's Snake Eagle *Circaetus beadouini*, Cameroon, 27 November 2008 (Fig. 3) and 5 January 2009 (Fig. 4; Ralph Buij). 'Trousers', vent, axillaries and undertail-coverts gradually become broadly barred through moult in older juveniles, and the throat coarsely mottled, while whitish tips to remiges are lost with wear.

Circaète de Beadouin *Circaetus beadouini* juvénile, Cameroun, 27 novembre 2008 (Fig. 3) et 5 janvier 2009 (Fig. 4 ; Ralph Buij). Chez les juvéniles plus âgés, la 'culotte', le bas-ventre, les axillaires et les sous-caudales acquièrent progressivement des barres plus larges après la mue et la gorge devient mouchetée, tandis que les bouts blancs des rémiges disparaissent par l'usure.

Juvenile *gallicus* appears almost uniformly pale below (Figs. 5–6), or have a rufous-brown hood and some spotting and streaking; they are separated from adults by fine, frequently even absent (and rather irregular) barring on the secondaries, and by the absence of a broad subterminal band to the wing. Also the rufous-brown colour of the hood and body markings differs from the greyer colour of adults.



Figures 5–6. Juvenile Short-toed Snake Eagle *Circaetus gallicus*, Cameroon, 14 January 2007 (Fig. 5; Ralph Buij) and Spain, 16 September 2011 (Fig. 6; Dick Forsman). Juveniles are usually pale below, with rufous-brown spotting and streaking on the head, breast and coverts. Note much-reduced barring on the secondaries and lack of a broad subterminal band to the wing, typical for juveniles. Narrower-winged than adult, thus shape more like Beaudouin’s Snake Eagle *C. beaudouini*.

Circaète Jean-le-Blanc *Circaetus gallicus* juvénile, Cameroun, 14 janvier 2007 (Fig. 5 ; Ralph Buij) et Espagne, 16 septembre 2011 (Fig. 6 ; Dick Forsman). Les juvéniles sont d’habitude pâles dessous, avec la tête, la poitrine et les couvertures tachetées et rayées de brun-roux. Noter les barres des secondaires très réduites et l’absence d’une large bande subterminale sur l’aile, caractéristiques des juvéniles. Les ailes sont plus étroites que chez l’adulte, produisant ainsi une silhouette plus semblable à celle du Circaète de Beaudouin *C. beaudouini*.





7



8

Figures 7–8. Juvenile Beaudouin's Snake Eagle *Circaetus beaudouini*, Cameroon, 20 July 2008 (Fig. 7) and 27 November 2008 (Fig. 8; Ralph Buij). Pale brown wing-coverts (but not as pale as juvenile Short-toed Snake Eagle *C. gallicus*), pale tips to greater coverts and mantle contrast with darker remiges and rectrices that have barely visible barring.

Circaète de Beaudouin *Circaetus beaudouini* juvénile, Cameroun, 20 juillet 2008 (Fig. 7) et 27 novembre 2008 (Fig. 8 ; Ralph Buij). Les couvertures alaires brun pâle (mais pas aussi pâles que chez le juvénile du *Circaète Jean-le-Blanc* *C. gallicus*), les bouts pâles des grandes couvertures et du manteau contrastent avec les rémiges et les rectrices foncées, qui ont des barres à peine visibles.

Upperparts. Upperwing-coverts, mantle and uppertail-coverts of juvenile *beaudouini* are pale brown, contrasting with dark brown remiges (Figs. 7–8). The greater coverts have pale tips and are darker than the lesser and median coverts. Three dark bars are barely visible on the wings and tail.

Fresh juvenile *gallicus* have more contrasting upperparts than *beaudouini*, with much paler, sandy-brown lesser and median coverts, sharply contrasting with the dark remiges (Figs. 9–10). The pale tips to the dark greater coverts form a more distinct pale band on the upperwing compared to juvenile *beaudouini*. Juvenile *gallicus*



9

Figures 9–10. Juvenile Short-toed Snake Eagle *Circaetus gallicus*, Israel, 8 October 2009 (Fig. 9) and Spain, 2 May 2011 (Fig. 10; Dick Forsman). Note paler upperwing-coverts, uppertail-coverts, tail and primaries, and compare with Figs. 7–8.

Circaète Jean-le-Blanc *Circaetus gallicus* juvénile, Israël, 8 octobre 2009 (Fig. 9) et Espagne, 2 mai 2011 (Fig. 10 ; Dick Forsman). Noter les couvertures sus-alaires et sus-caudales, la queue et les rémiges primaires plus pâles; comparer avec les Figs. 7–8.



10

also shows much broader white tips to the remiges and rectrices than *beaudouini*, and the tail has three distinct dark bands (Figs. 7–10).

Perched. Perched juvenile *beaudouini* are dark rufous-brown (Figs. 11), with a paler brown head and upperwing-coverts contrasting with the darker underparts, remiges and back.

Juvenile *gallicus* is a much paler bird than *beaudouini* (Figs. 12), with more contrasting pale

coverts and dark remiges, and a rufous-brown hood and white belly. Wingtips reach the tail tip in both.

Transition plumage

The transition of juvenile *beaudouini* into adult-plumage type is characterised by the gradual fading and replacement of the rufous-brown underparts, which become variably mottled rufous-brown



Figures 11–12. Perched juvenile Beaudouin's Snake Eagle *Circaetus beaudouini*, Cameroon, 22 February 2009 (Fig. 11) and Short-toed Snake Eagle *C. gallicus*, Cameroon, 22 December 2007 (Fig. 12; Ralph Buij). The head and upperwing-coverts of the latter are paler than in Beaudouin's Snake Eagle.

Juvéniles perchés du Circaète de Beaudouin *Circaetus beaudouini*, Cameroun, 22 février 2009 (Fig. 11) et du Circaète Jean-le-Blanc *C. gallicus*, Cameroun, 22 décembre 2007 (Fig. 12 ; Ralph Buij). La tête et les couvertures alaires de ce dernier sont plus pâles que celles du Circaète de Beaudouin.

Figure 13. Transitional-plumage Beaudouin's Snake Eagle *Circaetus beaudouini*, Cameroon, 25 July 2007 (Ralph Buij). The transition from juvenile to adult plumage is characterised by gradual loss of rufous-brown colour below, pale underwings with a few rufous-brown spots, and a pale head. Note that the new secondaries have adult-type barring, but there is no or hardly visible barring on the freshly moulted inner primaries.

Circaète de Beaudouin *Circaetus beaudouini* en plumage transitoire, Cameroun, 25 juillet 2007 (Ralph Buij). La transition du plumage juvénile au plumage adulte se caractérise par la perte progressive du brun-roux dessous, un dessous de l'aile pâle avec quelques taches brun-roux, et une tête claire. Noter que les nouvelles rémiges secondaires ont des barres de type adulte, mais les primaires proximales fraîchement muées sont dépourvues de barres ou, si elles en ont, elles sont à peine visibles.





14



15

Figures 14–15. Second-plumage Short-toed Snake Eagle *Circaetus gallicus*, Spain, 10 September 2012 (Fig. 14) and 16 September 2011 (Fig. 15; Dick Forsman). Still very similar to juveniles, with a mix of juvenile and adult-type remiges, and rufous-brown markings. Compare to Fig. 13.

Circaète Jean-le-Blanc *Circaetus gallicus* de deuxième année, Espagne, 10 septembre 2012 (Fig. 14) et 16 septembre 2011 (Fig. 15 ; Dick Forsman). Encore très semblable aux juvéniles, avec un mélange de rémiges juvéniles et de type adulte, et des marquages brun-roux. Comparer avec la Fig. 13.

during the second year (Fig. 13), with underwing-coverts turning pale and eventually retaining only a few rufous-brown spots and a paler head. It is still readily separated from all plumages of *gallicus*, which never shows the combination of pale underwing-coverts with dark rufous-brown mottling and paler head. During the course of the first complete moult, immatures change gradually to become more like adults.

In *gallicus* second-plumage-type birds are still rather similar to juveniles, with a characteristic mix of juvenile and more adult-type remiges (*cf.* Forsman 1998: 160; Figs. 14–15). The majority of

second-plumage-type birds are actively moulting on the winter grounds in sub-Saharan Africa, with replaced inner primaries but retained juvenile outer primaries and most juvenile secondaries on arrival in September–October.

Adults

Underparts. Adult *beaudouini* are white below, with a brownish-grey head and upper breast, and fine barring on the lower breast, belly, flanks and undertail-coverts, less extensively or absent on the thighs and vent in some (Figs. 16–17) but not all individuals (Figs. 18–19). Some adults



16



17



18



19

Figures 16–17. Adult Beaudouin’s Snake Eagle *Circaetus beaudouini*, Cameroon, 20 July 2008 (Fig. 16) and 25 September 2009 (Fig. 17; Ralph Buij). Note clean overall impression. The contrasting narrow bars on the remiges and grey-brown head distinguish these birds from Short-toed Snake Eagle *C. gallicus*. Also, fine bars on underparts rather than blotches as in Short-toed Snake Eagle.

Circaète de Beaudouin *Circaetus beaudouini* adulte, Cameroun, 20 juillet 2008 (Fig. 16) et 25 septembre 2009 (Fig. 17 ; Ralph Buij). Noter l’impression générale nette. Ces oiseaux se distinguent du Circaète Jean-le-Blanc *C. gallicus* par les nettes barres étroites sur les rémiges et la tête brun-gris. De plus, le dessous a de fines barres plutôt que des taches.

Figures 18–19. Adult Beaudouin’s Snake Eagle *Circaetus beaudouini*, Cameroon, 27 August 2006 (Fig. 18) and 2 August 2008 (Fig. 19; Ralph Buij). Typical adults with solid dark grey-brown hood and fine barring on underparts. Adults usually appear narrower winged than adult Short-toed Snake Eagles *C. gallicus* (cf. Figs. 16–17 and 20–21).

Circaète de Beaudouin *Circaetus beaudouini* adulte, Cameroun, 27 août 2006 (Fig. 18) et 2 août 2008 (Fig. 19 ; Ralph Buij). Adultes typiques avec un capuchon plein brun-gris foncé et le dessous finement barré. Les ailes des adultes apparaissent généralement plus étroites que celles des adultes du Circaète Jean-le-Blanc *C. gallicus* (cf. Figs. 16–17 et 20–21).



Figures 20–21. Adult Short-toed Snake Eagle *Circaetus gallicus*, Spain, 7 September 2007 (Fig. 20) and Cameroon, 29 December 2006 (Fig. 21; Ralph Buij). Adults are more heavily marked below than juveniles, typically blotched rather than barred and more irregularly marked compared to narrower winged Beaudouin’s Snake Eagle. Also note browner coloration and less contrasting brown hood and barring on remiges than Beaudouin’s Snake Eagle (cf. Figs. 18–19).

Circaète Jean-le-Blanc *Circaetus gallicus* adulte, Espagne, 7 septembre 2007 (Fig. 20) et Cameroun, 29 décembre 2006 (Fig. 21 ; Ralph Buij). Les adultes ont le dessous plus fortement marqué que les juvéniles et sont généralement tachetés plutôt que barrés et plus irrégulièrement marqués comparés aux adultes du Circaète de Beaudouin *C. beaudouini*, qui ont les ailes plus étroites. Noter également la coloration plus brune, et le capuchon brun et les barres sur les rémiges moins contrastées que chez le Circaète de Beaudouin (cf. Figs. 18–19).



22



23

Figures 22–23. Adult Beaudouin's Snake Eagle *Circaetus beaudouini*, Cameroon, 15 April 2010 (Fig. 22) and 2 August 2008 (Fig. 23; Ralph Buij). The upperparts are uniformly dark grey-brown, with narrow but distinct barring and a small white margin on wings and tail.

Circaète de Beaudouin *Circaetus beaudouini* adulte, Cameroun, 15 avril 2010 (Fig. 22) et 2 août 2008 (Fig. 23 ; Ralph Buij). Le dessus est uniformément brun-gris foncé, barré finement mais distinctement sur les ailes et la queue, qui sont étroitement bordées de blanc.

only possess barring on the axillaries and flanks. Similarly, some adults have a more solid hood, whereas others have streaks on a pale upper breast and throat (Figs. 16–19). The axillaries, greater and median coverts also have fine dark barring, whereas the lesser coverts are unmarked. Due to moult, worn and fresh feathers occur side by side, often producing a ragged trailing edge to the wings and tail. Remiges and rectrices have four narrow bands, with a slightly broader subterminal band; pp6–10 lack barring as in juveniles. The 'fingers' are dark-tipped. All in all, the adult plumage of *beaudouini* looks typically very clean, with distinct and regular fine markings, lacking the somewhat 'scruffy' look of adult *gallicus*, owing to the latter's bolder and more irregular plumage markings. Adult *gallicus* is also broader winged than *beaudouini* (Figs. 20–21), more so than juveniles, from which they are separated by the presence of differently aged remiges. Finally, adult *gallicus* are more heavily marked, with broader barring on the remiges and a more distinct broad trailing edge to the wings and tail than juveniles, while the grey-brown hood has lost

any hint of rufous coloration and may be more or less complete.

Upperparts. Adult *beaudouini* lack the contrast on the upperwing of juveniles (Figs. 22–23), and have dark grey-brown coverts and slightly darker remiges. Greater coverts also retain pale tips, but less conspicuously so than in juveniles, and are hardly visible in some adults. Unlike in *gallicus*, the greater coverts are clearly barred in close views. The wings and tail have three clear bands of similar width.

The wings of adult *gallicus* retain a pale trailing edge as in juveniles, but the pale brown upperwing-coverts contrast less with the darker remiges (Figs. 24–25); still, the contrast is much more evident, particularly at a distance, compared to adult *beaudouini*. Adults have only vague barring on the remiges, compared to the bold barring in adult *beaudouini* (compare Figs. 22–25). Also, the tail has fewer and broader bands than *beaudouini*, the subterminal band is broader and the fanned tail becomes clearly paler towards the edges.

Perched. A perched *beaudouini* is dark grey-brown overall (Fig. 26), lacking contrast between the coverts and remiges, unlike the browner



24

Figures 24–25. Adult Short-toed Snake Eagle *Circaetus gallicus*, Cameroon, 13 January 2007 (Fig. 24; Ralph Buij) and Spain, 28 April 2011 (Fig. 25; Dick Forsman). Compare with more uniform grey-brown upperparts of adult Beaudouin’s Snake Eagle *C. beaudouini* (Figs. 22–23).

Circaète Jean-le-Blanc *Circaetus gallicus* adulte, Cameroun, 13 janvier 2007 (Fig. 24; Ralph Buij) et Espagne, 28 avril 2011 (Fig. 25 ; Dick Forsman). Comparer avec le dessus plus uniformément brun-gris chez l’adulte du Circaète de Beaudouin *C. beaudouini* (Figs. 22–23).



25

juveniles. The barred greater coverts are often quite conspicuous.

Adult *gallicus* has pale brown coverts contrasting with dark remiges (Fig. 27), but less so than juveniles. Most have a brownish-grey hood and broad blotching on the underparts, versus fine barring on the underparts of adult *beaudouini*.

Discussion

We reiterate previous statements that separation of Beaudouin’s Snake Eagle and Short-toed Snake Eagle is straightforward (Clark 2000), and claims of ‘intermediate’ or indistinguishable birds in the field have probably been mostly based on the lack

of decent illustrations in field guides rather than anything else. The illustrations of these species in Ferguson-Lees & Christie (2001) and regional handbooks such as Borrow & Demey (2001) marked a significant improvement on previous handbooks and guides, some of which erroneously illustrated adults of both species as very closely resembling each other in coloration and markings (e.g. del Hoyo *et al.* 1994). However, the illustrations lack important and useful details that aid identification. For example, those in Borrow & Demey (2001) show almost uniformly dark brown adults in both species (upperparts are paler brown in Short-toed, grey-brown in Beaudouin’s;



Figures 26–27. Perched adult Beaudouin's *Circaetus beaudouini*, Cameroon, 15 April 2010 (Fig. 26; Ralph Buij) and Short-toed Snake Eagles *C. gallicus*, Israel, 7 October 2009 (Fig. 27; Dick Forsman). Adult Beaudouin's Snake Eagle is uniformly dark grey-brown on the upperparts, versus contrasting sandy-brown coverts of Short-toed Snake Eagle.

Adultes perchés du Circaète de Beaudouin *Circaetus beaudouini*, Cameroon, 15 avril 2010 (Fig. 26; Ralph Buij) et Jean-le-Blanc *C. gallicus*, Israel, 7 octobre 2009 (Fig. 27 ; Dick Forsman). Le Circaète de Beaudouin a le dessus uniformément brun-gris foncé, tandis que le Jean-le-Blanc a les couvertures alaires brun-sable contrastantes.

cf. Figs. 26–27), which differ mainly in the width and extent of markings on the underparts, while juvenile Beaudouin's are depicted with dark-brown upperparts lacking paler coverts. The flight illustrations in Ferguson-Lees & Christie (2001) show adult Beaudouin's with a paler brown (not grey-brown) hood than Short-toed Snake Eagle. Also, we have never observed the uniform 'largely whitish' post-juvenile plumage of Beaudouin's Snake Eagle, with whitish upperwing-coverts

depicted in Ferguson-Lees & Christie (2001), which they reported to occur in the second and into the third year. Rather, individuals in their second year appear to always retain a variable number of rufous-brown markings, replaced during the second year by a more adult-like hooded appearance and finely barred underparts. Other field guides have also shown or described pale subadults with a completely whitish head and underparts (Kemp & Kemp 1998), or even pale juveniles (del Hoyo *et al.* 1994), but as pointed out by Clark (1999), these were probably based on a misidentified specimen of a juvenile Short-toed Snake Eagle in the collection of the Natural History Museum, Tring.

Ornithologists and birdwatchers are increasingly finding Beaudouin's Snake Eagle east of Chad and Sudan, in west and north-west Uganda (rather common: DF pers. obs.) and western Kenya (Clark *et al.* 2005; C. Jackson *in Bull. ABC* 20: 98, 2013), i.e. east of the distribution often depicted (Kemp & Kemp 1998, Ferguson-Lees & Christie 2001, but see del Hoyo *et al.* 1994). As such, the winter range of *gallicus* appears to almost completely overlap with the range of *beaudouini*. However, in these eastern parts of the distribution, confusion of *beaudouini* with Black-chested Snake Eagle *C. pectoralis*, both as adults and juveniles, is a much more relevant concern.

Acknowledgements

We thank William S. Clark, Alan Kemp and Ron Demey for their comments that improved an earlier version of this article.

References

Borrow, N. & Demey, R. 2001. *A Guide to the Birds of Western Africa*. Princeton, NJ: Princeton University Press.

BirdLife International. 2013. BirdLife's globally threatened bird forums. www.birdlife.org/globally-threatened-bird-forums/2013/03/beaudouins-snake-eagle-circaetus-beaudouini-uplist-to-endangered (accessed 25 August 2013).

Buij, R., Croes, B. M. & Komdeur, J. 2013. Biogeographical and anthropogenic determinants of landscape-scale patterns in a West African raptor assemblage. *Biodiver. & Conserv.* 22: 1623–1646.

Clark, W. S. 1999. Plumage differences and taxonomic status of three similar *Circaetus* snake eagles. *Bull. Br. Ornithol. Cl.* 119: 56–59.

Clark, W. S. 2000. Field identification of Beaudouin's Snake Eagle *Circaetus (gallicus) beaudouini*. *Bull. ABC* 7: 1–13.

Clark, W. S. & Barlow, C. 2004. Status of Short-toed Snake Eagle *Circaetus gallicus* and Beaudouin's Snake Eagle *C. beaudouini* in The Gambia. *Bull. ABC* 11: 27–29.

Clark, W. S., Fisher, D., Finch, B., de Bruijn, B. & Shani, I. 2005. Status of Beaudouin's *Circaetus beaudouini* and Short-toed Snake Eagles *C. gallicus* in Kenya. *Bull. ABC* 12: 150–152.

del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) 1994. *Handbook of the Birds of the World*. Vol. 2. Barcelona: Lynx Edicions.

Ferguson-Lees, J. & Christie, D. A. 2001. *Raptors of the World*. London, UK: Christopher Helm.

Forsman, D. 1998. *The Raptors of Europe and the Middle East: A Handbook of Field Identification*. London, UK: T. & A. D. Poyser.

IUCN. 2013. The IUCN Red List of threatened species. Version 2013.1. www.iucnredlist.org (accessed 10 August 2013).

Kemp, A. & Kemp, M. 1998. *Birds of Prey of Africa and its Islands*. London, UK: New Holland.

Stevenson, T. & Fanshawe, J. 2002. *Field Guide to the Birds of East Africa*. London, UK: T. & A. D. Poyser.

Thiollay, J.-M. 1977. Distribution saisonnière des rapaces diurnes en Afrique occidentale. *Oiseau & R.F.O.* 47: 253–285.

Thiollay, J.-M. 1978. Les migrations de rapaces en Afrique occidentale: adaptations écologiques aux fluctuations saisonnières de production des écosystèmes. *Terre & Vie* 32: 89–133.

Thiollay, J.-M. 2006. The decline of raptors in West Africa: long-term assessment and the role of protected areas. *Ibis* 148: 240–254.

Zimmerman, D. A., Turner, D. A. & Pearson, D. J. 1996. *Birds of Kenya and Northern Tanzania*. London, UK: Christopher Helm.

^a *Animal Ecology Department, Alterra Wageningen UR, Droevendaalsesteeg 3A, 6708 PB Wageningen, Netherlands. E-mail: ralph.buij@gmail.com*

^b *PO Box 46, 02401 Kirkkonummi, Finland. E-mail: dick@dickforsman.com*

Received 6 November 2013; revision accepted 30 January 2014.